

The Use of Turning and Repositioning Versus Pressure Redistributing Support Surfaces in the
Prevention of Pressure Ulcers

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Abstract

Currently, 1.3-3 million adults in the United States are affected by pressure ulcers, costing \$37,800 to \$70,000 per ulcer (Smith, 2013). This costs the United States 11 billion dollars annually (Smith, 2013). This review's PICO question is "In hospitalized critically ill patients, how does turning and repositioning every two to four hours compared to the use of pressure redistributing support surfaces prevent the occurrence of pressure ulcers?" For this review, the articles found were rated as excellent (n=7), good (n=2), and fair (n=1). Appendix A shows the critical appraisal of all pertinent articles used. Findings suggest that there is minimal statistically significant evidence that the use of one intervention is more effective than another (pressure redistributing support surfaces versus turning and repositioning every two to four hours) (Bergstrom, 2013; Chou, 2013; Huang, 2013; Manzano, 2013; Manzano, 2014; Rich, 2011b; Smith, 2013). Furthermore, findings indicate that when both interventions are used together, pressure ulcer prevention is increased (Chou, 2013; Rich, 2011a; Smith, 2013).

Key words: Pressure ulcers, alternating pressure mattresses, pressure ulcer prevention, turning and repositioning

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Pressure ulcers (PU) affect approximately 1.3 to 3 million adults in the United States alone (Chou, 2013). A pressure ulcer can be characterized as “an area of localized damage to skin and underlying tissue over a bony prominence, as a result of pressure, or pressure in combination with shear” (Chou, 2013, p. 28). Currently, in the United States, the annual cost of pressure ulcers is approximately 11 billion dollars, with the treatment range per PU at \$37,800 to \$70,000 (Smith, 2013). Since October of 2008, hospitals no longer receive Medicare reimbursement for patients who acquire Stage 3 or 4 pressure ulcers during their inpatient stay (Zaratkiewica et al., 2010). Private insurers are also adopting these reimbursement restrictions (Mattie & Webster, 2008). Recent research has shown that there are various methods to prevent the occurrence of pressure ulcers. This review’s PICO question is “In hospitalized critically ill patients, how does turning and repositioning every two to four hours compared to the use of pressure redistributing support surfaces prevent the occurrence of pressure ulcers?”

P: Critically ill patients

I: Turning & repositioning q 2-4 hours

C: Pressure redistributing support surfaces

O: Prevention of pressure ulcers

The purpose of this review is to assess which intervention best prevents pressure ulcers in critically ill patients.

Methods

Search Strategy

The search for articles was conducted through PubMed, Cedarville Library OneSearch, Cedarville Library EBSCOhost, and UpToDate. The search included the terms *pressure ulcers*, *alternating pressure mattresses*, *pressure ulcer prevention*, *turning and repositioning*.

Inclusion and Exclusion

The research process began by selecting 20 articles that had to do with the topic of pressure ulcers. These articles were found using the Cedarville library databases. From there, the articles were narrowed down to 10 that specifically dealt with the topic of turning and repositioning and pressure redistributing support surfaces. Of those chosen, 7 were classified as excellent (LOE 1-3), 2 were classified as good (LOE 4-5), and 1 was classified as fair (LOE 6-7). Eight articles were completely removed from the process because of small sample size (n=1), no relevance to our topic (n=6), and over 5 years from the current date (n=1). The remaining two articles were used to define and explain certain concepts.

Interview

For this review, an interview was conducted with an RN at Miami Valley Hospital, who worked on a cardiovascular unit. She stated that the standard for patient care was the use of PRSSs, specifically air pressure alternating mattresses. In addition to the use of PRSSs, T&R every two hours was employed. Turning and repositioning was predominantly used in patients who were at a higher risk for skin breakdown according to the Braden scale (RN at Miami Valley Hospital, personal communication, Oct. 20, 2014).

Critical Appraisal

A critical appraisal was completed for each article (See Appendix A). In the appraisal of these ten articles, four recurrent themes emerged. Themes revolved around the use of T&R alone, PRSS use as a sole intervention, the presence of a gap, and the implementation of both interventions to better prevent PU.

Results

Turning and Repositioning

This review's first finding stated that there was minimal statistically significant evidence that T&R every two to four hours is effective in the prevention of pressure ulcers. The article by Manzano et al. (2014) stated that increasing the frequency of T&R (q 2 h vs q 4 h) was not significant in the reduction of PUs. Yet another article found that there was no significant difference in the T&R intervals (q 2, 3, & 4 h) in the reduction of PUs (Bergstrom, 2013). According to Rich et al. (2011a), frequent repositioning was not found to decrease the rate of PUs. However, this does not mean that frequent manual repositioning is not needed. The finding solely calls into question how effective T&R is at preventing PUs. Additional studies are needed to determine the best repositioning schedule (i.e. q 2 to 4 h). Repositioning may be important in the higher risk patient population, but further research is needed to validate this finding.

Pressure Redistributing Support Surfaces

The second finding indicated minimal statistically significant evidence that the use of PRSSs were effective in the prevention of pressure ulcers. According to Rich et al. (2011b), the incidence of PU rates was not lowered with PRSS use. The article published by Huang et al. (2013) stated that although PRSSs can effectively decrease the amount of postoperative PUs,

there is not enough statistically significant evidence stating that the reduction rates are high enough for this comparison to be implemented on a regular basis. Manzano's "Comparison of Alternating Pressure Mattresses and Overlays" (2012) states that the use of PRSSs is a protective factor against pressure ulcer onset; however adherence to preventive measures were highly inconsistent. Therefore, this is not acceptable as a statistically significant finding. According to Chou et al. (2013), there is limited evidence for the effectiveness of PRSSs and other preventative interventions (heel boots, wheelchair cushions, and nutritional supplementation). Smith et al. (2013) found moderate evidence showing that healing of pressure ulcers in adults improves with the use of PRSSs.

CBPM. Behrendt et al. (2014) states that continuous bedside pressure mattresses (CBPM) cannot be directly correlated with a decreased rate in hospital acquired PUs. Although the use of CBPM is suggested to be an effective prevention tool, more empirical evidence is needed to validate this finding. According to Manzano et al. (2014), more studies are needed to determine the best repositioning schedule in those patients who manifest a higher risk of developing PUs.

Compare and Contrast T&R and PRSS

Gap. Research shows that a gap still exists in the evidence and that further research is needed to statistically prove that one intervention is better than the other. Although Masterson & Younger's (2014) article shows a significant absence of heel PUs, their small sample size and short evaluation period do not allow these findings to be generalized. More data is needed to prove its efficacy. Huang et al. (2013) states that evidence is still needed to support the routine use of PRSSs in the postoperative setting. This is still true despite their finding that PRSSs are effective in decreasing surgery related PUs. Manzano et al. (2012), states that further "robust"

studies are needed to further test the hypothesis that alternating pressure air mattresses are more effective than alternating pressure air overlays. In the article by Rich et al. (2011b), a gap is still evident due to the small sample of bed bound participants observed. In these participants, there was no distinction in the incidence rate of pressure ulcers related to the use of different PRSSs. According to Chou et al. (2013) and Smith et al. (2013), further research is needed to show the effectiveness of standard care as compared to the use of PRSSs.

Effective together. The final finding was that turning and repositioning when coupled with pressure redistributing support surfaces is effective in the prevention of pressure ulcers. Rich et al. (2011a) states that PRSSs serve as cues for medical personnel to turn patients, therefore increasing frequent repositioning. These findings suggested that this is the main reason providers are using a combination of both preventative measures. Chou et al. (2013) found that rather than exclusively using PRSSs, a combination of both T&R and PRSSs may be more effective. According to Smith et al. (2013), moderate strength evidence shows that the use of PRSSs when combined with T&R and other interventions (i.e. protein supplementation, radiant heat dressings, and electrical stimulation), improves complete healing in adults with pressure ulcers.

Discussion

The Iowa Model of Evidence-Based Practice to Promote Quality Care guided the selection of this topic based on its importance to the health care community. Sufficient data was gathered to support this review's recommendations and the adoption of the intervention in the healthcare setting (Titler et al. 2001).

Critical appraisals of the articles resulted in four separate findings. The first finding showed that there was minimal statistically significant evidence of the effectiveness of T&R every two to four hours in the prevention of pressure ulcers (Bergstrom, 2013; Manzano, 2014; Rich, 2011b). The next finding indicated minimal statistically significant evidence that the use of PRSSs were effective in the prevention of pressure ulcers (Chou, 2013; Huang, 2013; Manzano, 2013; Rich, 2011b; Smith, 2013). Another major finding was that a gap still exists in the evidence and further research is needed to statistically prove that one intervention is better than another (Behrendt, 2014; Chou, 2013; Huang, 2013; Manzano, 2013; Manzano, 2014; Masterson & Younger, 2014; Rich, 2011b; Smith, 2013). The final finding stated that when coupled together, T&R and PRSSs are more effective than when used separately (Chou, 2013; Rich, 2011a; Smith, 2013).

Evidence-Based Recommendations

The recommendation of the researchers, based on the information gathered throughout this process, is that the standard of care of T&R every 2 hours, when coupled with the use of PRSSs, is most effective in the prevention of PUs (Chou, 2013; Rich, 2011a; Smith, 2013). However, a gap still exists, and further studies are needed to address the efficacy of this recommendation, as well as the use of other alternative interventions (Behrendt, 2014; Chou, 2013; Huang, 2013; Manzano, 2013; Manzano, 2014; Masterson & Younger, 2014; Rich, 2011b; Smith, 2013).

Limitations

One limitation of this review was that other interventions were not explored. Research identified other comparative measures; however, they were not the focus of this review. These

interventions, which should be investigated further, include the use of protein and nutritional supplements, radiating heat dressings, electrical stimulation, the preservation of hygiene, and as a last result, surgery (Smith 2013).

Another limitation was the lack of generalization across the patient population. In Rich et al. (2011b) he states that the findings of the study were non-generalizable due to the limited population of bedfast elders with hip fractures, errors committed throughout the study, and the fact that the study was observational in nature. Since this study reviewed only critically ill patients, the results cannot be generalized because it failed to account for the other patients who are also at risk for PUs.

Conclusion

This review concludes that further research studies are needed to provide statistically significant evidence that one intervention is superior to the other. The research has shown that turning and repositioning when coupled with pressure redistributing support surfaces has a greater impact in the prevention of pressure ulcers than one intervention alone (Chou, 2013; Rich, 2011a; Smith, 2013). A limitation of this review was that the sole focus was pressure redistributing support surfaces as a comparison. However, it is also important to realize that this is not the only comparative intervention.

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Appendix A

Critical Appraisal of Literature

Author(s) & Year	Purpose	Sample	Treatment	Results	LOE
Behrendt... Siddiqui (2014)	tests effectiveness of continuous bedside pressure mapping (CBPM) in reducing hospital-associated pressure ulcers (HAPU) in pts treated in a medical ICU (MICU)	422 pts admitted to MICU at Henry Ford Hospital based on bed availability, scoring 18 or less for PU risk on Braden scale assessment	CBPM programmed to notify staff to turn pts q 2 h to match q 2 h protocol for the control group	CBPM group: 2 of 213 pts (0.9%) had HAPUs--stage 2 PUs Control group: 10 of 209 (4.8%) had HAPUs--stage 2 PUs	3
Bergstrom... Watkins (2013)	To determine the efficacy of three repositioning schedules for PU prevention in nursing home (NH) residents	942 consenting residents ages 65 and older with no PU, but were at a moderate (13-14) to high (10-12) risk for developing PUs according to the Braden scale. Pts also had mobility limitations and were already using high-density foam mattresses.	Participants were repositioned while in bed. The pts were randomly assigned according to their risk stratification to being repositioned q 2, 3, or 4 h for 3 wks. Blinded assessors assessed skin weekly. Repositioning was expected to be completed within 30 mins of the scheduled time with documentation at each episode.	There was no significant difference in PU incidence according to repositioning group (2, 3, or 4 h), nor was there a statistically significant difference in the incidence of PU between the high and moderate risk groups. When high-density foam mattresses effectively redistribute pressure, less-frequent repositioning may be possible without increasing PU incidences.	2

Author(s) & Year	Purpose	Sample	Treatment	Results	LOE
Chou... Buckley (2013)	To review the comparative clinical utility of pressure ulcer risk assessment instruments and the benefits and harms of preventive interventions.	Randomized trials and observational studies on effects of using risk assessment on clinical outcomes and randomized trials of preventive interventions on clinical outcomes.	N/A	More advanced static support surfaces are more effective than standard hospital mattresses for preventing PU in higher-risk pts. There was limited evidence on the effectiveness and competitiveness of dynamic surfaces and limited evidence on other preventative interventions.	1
Huang... Xu-Juan (2013)	To assess the relative preventative impact of pressure-redistribution surfaces (PRS) versus standard hospital mattresses on the incidence of surgery-related PU.	10 studies that met the inclusion criteria and provided sufficient data for meta-analysis.	N/A	Post-op use of PRS can effectively decrease the incidence of surgery-related PU, while evidence is still not sufficient for routine use of these surfaces intra-operatively.	1
Manzano... Fernández-Mondejar (2012)	Compare the effectiveness of alternating pressure air mattress (APAM) vs. overlays to prevent PUs in mechanically ventilated pts	221 pts on invasive or non-invasive mechanical ventilation for 24 hours or more	Pts were divided into two groups. One group used APAM and the other used overlays. Both groups used standard protocol of turning and repositioning q 4 h	Stage 2 or greater PUs occurred in 18.67 cases per 1000 days of ICU stay in the overlay group and 12.41 cases per 1000 days of ICU stay in the APAM group.	3

Author(s) & Year	Purpose	Sample	Treatment	Results	LOE
Manzano... Fernández- Mondéjar (2014)	Compare the effectiveness of repositioning q 2 or 4 h for preventing PU development in patients in ICU under mechanical ventilation	329 critically ill adults with no PU at ICU admission who received invasive mechanical ventilation for at least 24 h	All patients were placed on an APAM and then divided into two groups. One group was turned q 2 h and the other was turned q 4 h	A pressure ulcer of at least stage 2 developed in 10.3% of pts turned q 2 h versus 13.4% of pts turned q 4 h. No significant difference was found between the two groups.	2
Masterson and Younger (2014)	To determine whether the Nimbus 4 with Wound Valve Technology in the heel section would effectively provide pressure relief by offloading the heels.	82 pts over a 10 wk period: 24 level 3 (advanced respiratory support) and 58 level 2 (more detailed observation or intervention)	Offloading the heel with other measures vs using the Nimbus 4	None of the pts cared for using the Nimbus 4 mattresses developed heel ulcer during the evaluation period.	7
Rich... Baumgarten (2011a)	Determine if manual repositioning q 2 h is linked with lower PUs in bed-bound elderly hip fracture pts; to determine adherence to manual repositioning recommendations	269 65 y.o. or older who had surgery for hip fracture between 2004-2007 in any 9 hospitals linked with Baltimore Hip Studies network, who were declared bed-bound by the Braden scale	Frequent manual repositioning	Pts frequently repositioned (12x/day or q 2 h) more likely than those repositioned less frequently to obtain PUs at baseline ($p=0.006$), as well as more likely to have high risk of nutrition-related complicates ($p=0.06$), and lower Braden scale score ($p=0.07$)	4

Author(s) & Year	Purpose	Sample	Treatment	Results	LOE
Rich... Baumgarten (2011b)	Evaluate the association between pressure-redistributing support surface (PRSS) use and incident PUs in older adults with hip fracture	650 people age 65 and older who underwent surgery for hip fracture	Pts receive standard of care according to their Braden scale score. Some pts were placed on a powered PRSS, some on a nonpowered PRSS, and some on no PRSS.	PUs, stage 2 or higher, were noted on study visits by the research nurse. PUs were observed at 4.5% of visits with powered PRSS, 3.6% with nonpowered PRSS, and 4.2% with no PRSS.	4
Smith... Saha (2013)	Examine the comparative effectiveness and harms of therapies and approaches to treating PU.	Randomized trials and comparative observational studies of treatment for PU in adults and noncomparative intervention series for surgical interventions and evaluation of harms. n=174	N/A	Moderate-strength evidence shows that healing of PU in adults is improved with the use of air-fluidized beds, protein supplementation, radiant heat dressing, and electrical stimulation.	1